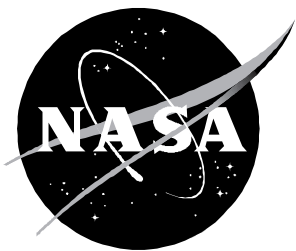


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Volume I

NASA Langley Scientific and Technical Information Output—1994

Marilou S. Phillips and Susan H. Stewart, Compilers

January 1995



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Marilou S. Phillips and Susan H. Stewart, Compilers
Langley Research Center • Hampton, Virginia

Foreword

This report contains a listing of the NASA Langley Research Center's scientific and technical research output for C.Y. 1994.

The intent of this report is to provide a greater awareness of the broad scope of results and the importance of the research and development work conducted by scientists and engineers at Langley. This current awareness is mandated by the National Aeronautics and Space Act of 1958, which provides for the widest practical dissemination of NASA research.

During C.Y. 1994, Langley's contributions to NASA and non-NASA literature included 132 NASA Formal Reports, 5 High-Numbered Conference Publications, 109 High-Numbered Technical Memorandums, 225 Contractor Reports, 368 Journal Articles and Other Publications, 499 Meeting Presentations, 9 Computer Programs, 90 Tech Briefs, 30 Patents, and 17 Special Documents. In addition, during the year, 10 conferences, symposia, and workshops were sponsored or cosponsored by Langley and held locally.

Barbara A. Pasternak
Assistant Chief, Scientific and Technical
Information Division

Introduction

The NASA Langley Research Center is one of the Nation's leading laboratories for research and development in the sciences of aeronautics and space technology. Langley conducts basic and applied research in fluid and flight mechanics, structures and materials, acoustics and noise reduction, measurement and instrumentation systems, numerical methods and techniques, data systems, electronics, physics, chemistry, and Earth and space sciences.

This publication is a compilation of Langley's scientific and technical research output for 1994 which is processed through the Center's Scientific and Technical Information Division, an integral part of NASA's Agency-wide Scientific and Technical Information (STI) system. This document is intended as a reference summary for researchers and as a current awareness publication for the scientific, research, and academic community.

The results of Langley's research are disseminated in a variety of NASA and non-NASA scientific and technical media and information systems. Details of the availability of the research references in this document are found in the section, "Availability," on page vii.

The citations are grouped by the "Scientific and Technical Aerospace Reports" (STAR) subject categories and listed alphabetically by author or innovator. The Langley organization to which the senior author or innovator is assigned and the Research and Technology Objectives and Plans (RTOP) number are noted below citations when appropriate and included in the indexes.

Computer Programs listed are those which were submitted by Langley to COSMIC in 1994.

The NASA Tech Briefs cited were published in 1994 in "NASA Tech Briefs," a journal for United States industry, entrepreneurs, and academia. Free subscriptions to this journal are available through the publisher, NASA Tech Briefs, 41 East 42nd Street, Suite 921, New York, New York 10017-5391 or by writing to the NASA Center for Aerospace Information, Technology Transfer Office, P. O. Box 8757, Baltimore, Maryland 21240-0757.

Patents listed, which are owned in whole or in part by Langley Research Center personnel, have been published in issues of STAR, a NASA announcement journal for report literature. A subscription to STAR is available from the U.S. Government Printing Office (GPO) or to qualified recipients from the NASA Center for Aerospace Information (CASI).

Publication of some journal articles was not known at press time for the 1993 issue of this document. These articles are therefore listed in the 1994 issue.

Conferences Sponsored or Cosponsored by Langley and Held Locally in 1994

Title of Conference	Date	Langley Contact	Langley		Non-Langley	
			Speakers	Attendees	Speakers	Attendees
1. Anechoic Chamber, Reverberation Chamber, and Compact Range Operators Workshop	5/4-5/94	C. W. Meissner, Jr.	5	19	22	62
2. FAA/NASA International Symposium on Advanced Structural Integrity Methods for Aircraft Durability and Damage Tolerance	5/4-6/94	C. E. Harris	2	10	38	253
3. Small Materials and Structures Workshop	5/16-17/94	S. A. Wise M. W. Hooker	4	70	11	15
4. NASA High Speed Research Program Sonic Boom Workshop	6/1-3/94	K. P. Shepherd D. A. McCurdy	9	20	21	38
5. Affordable Design and Manufacturing (ADAM) Workshop	8/30-9/1/94	J. M. Housner W. J. Stroud	1	7	10	52
6. Scramjet Ground Test Techniques and Methodology Workshop	9/27-29/94	R. W. Guy	2	10	10	16
7. First HSR Airframe Materials and Structures Workshop	10/17-21/94	R. H. Ricketts	19	95	26	101
8. ICASE/LaRC Workshop on Adaptive-Grid Methods	11/7-9/94	J. L. Thomas M. Y. Hussaini	2	17	19	42
9. Third National Symposium on Large-Scale Structural Analysis on High Performance Computers and Workstations	11/8-11/94	O. O. Storaasli J. M. Housner	2	18	32	66
10. Textiles Mechanics Conference	12/6-8/94	C. C. Poe, Jr.	3	12	20	59
Totals			49	278	209	704

Availability

<u>Category</u>	<u>Source</u>
NASA Reports	NASA Center for AeroSpace Information (CASI) 800 Elkridge Landing Road Linthicum Heights, MD 21090-2934 (301) 621-0390 National Technical Information Service (NTIS) 5285 Port Royal Road Springfield, VA 22161-2171 (703) 487-4650
Computer Programs	Computer Software Management and Information Center (COSMIC) The University of Georgia 382 East Broad Street Athens, GA 30602-4272
Langley Tech Briefs	Technology Transfer Team Mail Stop 200 NASA Langley Research Center Hampton, VA 23681-0001 (804) 864-9284
Patents:	
Patent Application Specifications	NASA Center for AeroSpace Information (CASI) National Technical Information Service (NTIS)
Printed Copies	Commissioner of Patents and Trademarks U.S. Patent and Trademark Office Washington, DC 20231

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Scientific and Technical Publications

Aeronautics

Category 01 Aeronautics (General)

- 1 Eckstrom, C. V.; Seidel, D. A.; and Sandford, M. C.: *Measurements of Unsteady Pressure and Structural Response for an Elastic Supercritical Wing*. NASA TP-3443, November 1994, 137 p.
Organization DS RTOP 505-63-50
- 2 Kroo, I. M.; Altus, S.; Braun, R. D.; Gage, P. J.; and Sobieski, I.: Multidisciplinary Optimization Methods for Aircraft Preliminary Design. Presented at Fifth AIAA/NASA/USAF/ISSMO Symposium on Multidisciplinary Analysis and Optimization, September 7-9, 1994, Panama City, Florida. AIAA Paper No. 94-4325.
Organization CB RTOP 242-10-01
- 3 Morrell, F. R. (Compiler): *FAA/NASA Joint University Program for Air Transportation Research 1992-1993*. NASA CP-3246, DOT/FAA/CT-94/03, February 1994, 173 p.
Organization DC RTOP 505-64-52
- 4 Ricks, W. R.; Jonsson, J. E.; and Rogers, W. H.: Cognitive Representations of Flight-Deck Information Attributes. *The International Journal of Aviation Psychology*, Volume 4, No. 1, January 1994, p. 65-83.
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- 5 Spearman, M. L.: A Review of 50 Years of Aerodynamic Research With NACA/NASA. Presented at 19th ICAS Congress/AIAA Aircraft Systems Conference, September 18-23, 1994, Anaheim, California. In Proceedings, Volume 1, p. 65, ICAS Paper No. 94-3.1.3.
Organization BA RTOP 505-69-20

Category 02 Aerodynamics

- 6 Alcenius, T.; Schneider, S. P.; Beckwith, I. E.; and Korte, J. J.: Development of Square Nozzles for High-Speed Low-Disturbance Wind Tunnels. Presented at AIAA 18th Aerospace Ground Testing Conference, June 20-23, 1994, Colorado Springs, Colorado. AIAA Paper No. 94-2578.
Organization DG RTOP 505-70-62
- 7 Allen, J. M.; and Watson, C. B.: *Experimental Study at Low Supersonic Speeds of a Missile Concept Having Opposing Wraparound Tails*. NASA TM-4582, November 1994, 55 p.
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- 8 Anders, S. G.; Asbury, S. C.; Brentner, K. S.; Bushnell, D. M.; Glass, C. E.; Hodges, W. T.; Morris, S. J., Jr.; and Scott, M. A.: *The Personal Aircraft—Status and Issues*. NASA TM-109174, December 1994, 126 p.
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- 9 Anderson, W. K.: A Grid Generation and Flow Solution Method for the Euler Equations on Unstructured Grids. *Journal of Computational Physics*, Volume 110, No. 1, January 1994, p. 23-38.
Organization DF RTOP 505-59-53
- 10 Anderson, W. K.; and Bonhaus, D. L.: An Implicit Upwind Algorithm for Computing Turbulent Flows on Unstructured Grids. *Computers & Fluids*, Volume 23, No. 1, January 1994, p. 1-21.
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- 11 Applin, Z. T.; Jones, K. M.; Gile, B. E.; and Quinto, P. F.: *Subsonic Aerodynamic Characteristics of Semispan Commercial Transport Model With Wing-Mounted Advanced Ducted Propeller Operating in Reverse Thrust*. NASA TP-3427, July 1994, 113 p.
Organization DA RTOP 535-03-10
- 12 Archinal, T. D.; Wilson, J. C.; and Brooks, T. F.: The Design and Analysis of a Radically Forward Swept Rotor. Presented at AHS Aeromechanics Specialists Conference, January 19-21, 1994, San Francisco, California. In Proceedings.
Organization DA RTOP 538-07-14
- 13 Asbury, S. C.; and Capone, F. J.: High-Alpha Vectoring Characteristics of the F-18/HARV. *Journal of Propulsion and Power*, Volume 10, No. 1, January-February 1994, p. 116-121.
Organization DA RTOP 505-62-30
- 14 Ashby, G. C., Jr.; Bernot, P. T.; and Woods, W. C.: *Pressure Distributions on a 0.02-Scale Space Shuttle Orbiter Nose at Mach 21.5 in Helium*. NASA TM-4495, January 1994, 74 p.
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- 15 Ashby, G. C., Jr.; Eves, J. W.; and White, D. R.: Miniature, Cooled Pressure-Measuring Probe. NASA Tech Brief LAR-13853.
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- 17 Askew, R. B.; and Quinto, P. F.: *User's Manual for the Model Interface and Plugboard Cabinets in the 14- by 22-Foot Subsonic Tunnel*. NASA TM-109062, April 1994, 54 p.
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- 19 Banks, D. C.; Singer, B. A.; Crockett, T. W.; Joslin, R. D.; and Kelley, M.: The Onset of Turbulence in a Shear Flow Over a Flat Plate. Presented at 21st International Conference on Computer Graphics and Interactive Techniques, July 24-29, 1994, Orlando, Florida.
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- 20 Banks, D. W.; Hall, R. M.; Erickson, G. E.; and Fisher, D. F.: Forebody Flow Field Effects on the High Angle-of-Attack Lateral-Directional Aerodynamics of the F/A-18. Presented at 32nd AIAA Aerospace Sciences Meeting and Exhibit, January 10-13, 1994, Reno, Nevada. AIAA Paper No. 94-0170.
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Organization DG RTOP 232-01-04
- 35 Bushnell, D. M.: Viscous Drag Reduction in Aeronautics. Presented at 19th ICAS Congress/AIAA Aircraft Systems Conference, September 18-23, 1994, Anaheim, California. In Proceedings, ICAS Paper No. 94-0.1.
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- 36 Bushnell, D. M.: Longitudinal Vortex Control—Techniques and Applications. *The Aeronautical Journal of the Royal Aeronautical Society*, October 1992, p. 293-312.
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- 37 Bushnell, D. M.: Drag Reduction. In *McGraw-Hill Yearbook of Science and Technology*, 1993, p. 107-109.
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- 38 Campbell, J. F.; and Chambers, J. R.: *Patterns in the Sky—Natural Visualization of Aircraft Flow Fields*. NASA SP-514, December 1994, 168 p.
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- 39 Cao, H. V.; Kusunose, K.; Spalart, P.; Ishimitsu, K.; Rogers, S.; and McGhee, R. J.: Study of Wind Tunnel Wall Interference for Multi-Element Airfoils Using a Navier-Stokes Code. Presented at AIAA 12th Applied Aerodynamics Conference, June 20-23, 1994, Colorado Springs, Colorado. AIAA Paper No. 94-1933.
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- 40 Carle, A.; Green, L. L.; Bischof, C. H.; and Newman, P. A.: Applications of Automatic Differentiation in CFD. Presented at AIAA 25th Fluid Dynamics Conference, June 20-23, 1994, Colorado Springs, Colorado. AIAA Paper No. 94-2197.
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- 41 Carlson, J. R.: *Computational Prediction of Isolated Performance of an Axisymmetric Nozzle at Mach Number 0.90*. NASA TM-4506, February 1994, 25 p.
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- 42 Carlson, J. R.; and Asbury, S. C.: *Two-Dimensional Converging-Diverging Rippled Nozzles at Transonic Speeds*. NASA TP-3440, July 1994, 108 p.
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- 43 Carpenter, M. H.; Gottlieb, D. I.; and Abarbanel, S. S.: Time-Stable Boundary Conditions for Finite-Difference Schemes Solving Hyperbolic Systems: Methodology and Application to High-Order Compact Schemes. *Journal of Computational Physics*, Volume 111, No. 2, April 1994, p. 220-226.
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| 44 | Carpenter, M. H.; and Kennedy, C. A.: <i>Third-Order 2N-Storage Runge-Kutta Schemes With Error Control</i> . NASA TM-109111, June 1994, 16 p. | Organization DG | RTOP 505-70-62 |
| 45 | Carpenter, M. H.; and Kennedy, C. A.: <i>Fourth-Order 2N-Storage Runge-Kutta Schemes</i> . NASA TM-109112, June 1994, 25 p. | Organization DG | RTOP 505-70-62 |
| 46 | Casper, J. H., Jr.; Shu, C-W.; and Atkins, H. L.: Comparison of Two Formulations for High-Order Accurate Essentially Non-Oscillatory Schemes. <i>AIAA Journal</i> , Volume 32, No. 10, October 1994, p. 1970-1977. | Organization DF | RTOP 505-59-53 |
| 47 | Chaffin, M. S.; and Berry, J. D.: <i>Navier-Stokes and Potential Theory Solutions for a Helicopter Fuselage and Comparison With Experiment</i> . NASA TM-4566, ATCOM-TR-94-A-013, June 1994, 28 p. | Organization DA | RTOP 505-59-36 |
| 48 | Chen, F-J.; and Wilkinson, S. P.: Design of Mach 2.4 Quiet Nozzles for the NASA Langley Supersonic Low-Disturbance Pilot Tunnel. Presented at AIAA 18th Aerospace Ground Testing Conference, June 20-23, 1994, Colorado Springs, Colorado. AIAA Paper No. 94-2506. | Organization DF | RTOP 505-59-50 |
| 49 | Cheng, T. S.; Wehrmeyer, J. A.; Pitz, R. W.; Jarrett, O., Jr.; and Northam, G. B.: Raman Measurement of Mixing and Finite-Rate Chemistry in a Supersonic Hydrogen/Air Diffusion Flame. <i>Combustion and Flame</i> , Volume 99, 1994, p. 157-173. | Organization DF | RTOP 505-70-62 |
| 50 | Choudhari, M. M.; and Streett, C. L.: A Finite Reynolds Number Approach for the Prediction of Boundary Layer Receptivity in Localized Regions. <i>Physics of Fluids A</i> , Volume 4, No. 11, November 1992, p. 2495-2514. | Organization DF | RTOP 505-59-50 |
| 51 | Cockrell, C. E.: Interpretation of Waverider Performance Data Using Computational Fluid Dynamics. <i>Journal of Aircraft</i> , Volume 31, No. 5, September-October 1994, p. 1095-1100. | Organization DA | RTOP 505-70-59 |
| 52 | Collier, F. S., Jr.: Recent Progress in the Development of Laminar Flow Aircraft. Presented at 19th ICAS Congress/AIAA Aircraft Systems Conference, September 18-23, 1994, Anaheim, California. In Proceedings, ICAS Paper No. 94-4.7.1. | Organization BB | RTOP 505-59-10 |
| 53 | Dahlburg, R. B.; Antiochos, S. K.; and Zang, T. A.: Secondary Instability in 3D Magnetic Reconnection. <i>Physics of Fluids B: Plasma Physics</i> , Volume 4, No. 12, December 1992, p. 3902-3914. | Organization DF | RTOP 505-59-40 |
| 54 | Darden, C. M.: Aeroacoustics. <i>Aerospace America</i> , December 1991, p. 73. | Organization BA | RTOP 537-03-21 |
| 55 | Dress, D. A.; Boyden, R. P.; and Cruz, C. I.: Measured and Theoretical Supersonic Dynamic Stability Characteristics of a National Aero-Space Plane Configuration. <i>Journal of Aircraft</i> , Volume 31, No. 3, May-June 1994, p. 597-602. | Organization DA | RTOP 505-59-40 |

- 56 Edwards, J. W.: Evaluation Report on Transonic Aerodynamics and Aeroelasticity. In *Transonic Unsteady Aerodynamics and Aeroelasticity*, AGARD CP-507, March 1992, p. T-1—T-15.
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- 58 Erickson, G. E.; and Inenaga, A. S.: *Fiber-Optic-Based Laser Vapor Screen Flow Visualization System for Aerodynamic Research in Larger Scale Subsonic and Transonic Wind Tunnels*. NASA TM-4514, January 1994, 68 p.
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- 59 Everhart, J. L.; and Bobbitt, P. J.: *Experimental Studies of Transonic Flow Field Near a Longitudinally Slotted Wind Tunnel Wall*. NASA TP-3392, April 1994, 72 p.
Organization DG RTOP 506-40-41
- 60 Fenno, C. C.; Streett, C. L.; and Hassan, B. A.: Use of Finite Volume Schemes for Transition Simulation. *AIAA Journal*, Volume 30, No. 4, April 1992, p. 1122-1124.
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- 61 Frink, N. T.: Recent Progress Toward a Three-Dimensional Unstructured Navier-Stokes Flow Solver. Presented at 32nd AIAA Aerospace Sciences Meeting and Exhibit, January 10-13, 1994, Reno, Nevada. AIAA Paper No. 94-0061.
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- 62 Garriz, J. A.; Vatsa, V. N.; and Sanetrik, M. D.: Issues Involved in Coupling Navier-Stokes Mean-Flow and Linear Stability Codes. Presented at 32nd AIAA Aerospace Sciences Meeting and Exhibit, January 10-13, 1994, Reno, Nevada. AIAA Paper No. 94-0304.
Organization DF RTOP 505-59-53
- 63 Gartenberg, E.; Weinstein, L. M.; and Lee, E. E., Jr.: Aerodynamic Investigation With Focusing Schlieren in a Cryogenic Wind Tunnel. *AIAA Journal*, Volume 32, No. 6, June 1994, p. 1242-1249.
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- 64 Gentry, G. L., Jr.; Takallu, M. A.; and Applin, Z. T.: *Aerodynamic Characteristics of a Propeller-Powered High-Lift Semispan Wing*. NASA TM-4541, April 1994, 68 p.
Organization DA RTOP 535-03-10
- 65 Ghaffari, F.: On the Vortical-Flow Prediction Capability of an Unstructured-Grid Euler-Solver. Presented at 32nd AIAA Aerospace Sciences Meeting and Exhibit, January 10-13, 1994, Reno, Nevada. AIAA Paper No. 94-0163.
Organization DA RTOP 505-59-53
- 66 Ghaffari, F.: *Navier-Stokes, Flight, and Wind Tunnel Flow Analysis for the F/A-18 Aircraft*. NASA TP-3478, December 1994, 65 p.
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- 67 Giuliano, V. J.; Flugstad, T. H.; Semmes, R.; and Wing, D. J.: Static Investigation and Computational Fluid Dynamics (CFD) Analysis of Flowpath Cross-Section and Trailing-Edge Shape Variations in Two Multiaxis Thrust Vectoring Nozzle Concepts. Presented at 30th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, June 27-29, 1994, Indianapolis, Indiana. AIAA Paper No. 94-3367.
Organization DA RTOP 505-59-30

- 68 Hahne, D. E.; and Coe, P. L., Jr.: The Low-Speed Stability and Control of Three Airbreathing Transatmospheric Vehicles. Presented at 32nd AIAA Aerospace Sciences Meeting and Exhibit, January 10-13, 1994, Reno, Nevada. AIAA Paper No. 94-0506.
Organization DC RTOP 505-61-81
- 69 Haimovitch, Y.; Gartenberg, E.; Roberts, A. S., Jr.; and Northam, G. B.: An Investigation of Wall Injectors for Supersonic Mixing Enhancement. Presented at 30th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, June 27-29, 1994, Indianapolis, Indiana. AIAA Paper No. 94-2940.
Organization DG RTOP 505-70-62
- 70 Hall, R. M.; and Banks, D. W.: Progress in Developing Gritting Techniques for High Angle of Attack Flows. Presented at 32nd AIAA Aerospace Sciences Meeting and Exhibit, January 10-13, 1994, Reno, Nevada. AIAA Paper No. 94-0169.
Organization DA RTOP 505-68-30
- 71 Hall, R. M.; Banks, D. W.; Fisher, D. F.; Ghaffari, F.; Murri, D. G.; and Ross, J. C.: A Status Report on High Alpha Technology Program (HATP) Ground Test to Flight Comparisons. Presented at Fourth NASA High Alpha Conference/Workshop, July 12-14, 1994, Edwards, California. In NASA CP-10143, Volume 1.
Organization DA RTOP 505-68-30
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Organization DA RTOP 505-59-53
- 73 Hernandez, G.; Wood, R. M.; and Covell, P. F.: *Effect of Leading- and Trailing-Edge Flaps on Clipped Delta Wings With and Without Wing Camber at Supersonic Speeds*. NASA TM-4542, May 1994, 103 p.
Organization DA RTOP 505-59-30
- 74 Hodges, W. T.; and Walker, G. W.: Free Flight Rotorcraft Flight Test Vehicle Technology Development. Presented at 32nd Annual Air Targets, UAVs and Range Operations Symposium and Exhibition, November 1-3, 1994, Lake Tahoe, Nevada.
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- 75 Huebner, L. D.: Computational Study of Plume-Induced Separation on a Hypersonic Powered Model. *Journal of Aircraft*, Volume 31, No. 6, November-December 1994, p. 1429-1431.
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Organization DF RTOP 505-59-53

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- 80 Jackson, T. L.; Macaraeg, M. G.; and Hussaini, M. Y.: Role of Acoustics in Flame/Vortex Interactions. *Journal of Fluid Mechanics*, Volume 254, September 1993, p. 579-604.
Organization DF RTOP 505-59-40
- 81 Jones, G. S.: Wind-Tunnel Requirements for Hot-Wire Calibration. Presented at AIAA 18th Aerospace Ground Testing Conference, June 20-23, 1994, Colorado Springs, Colorado. AIAA Paper No. 94-2534.
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